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USING DISTRIBUTION COSTS IN DECISION MAKING AT THE DENNISON MANUFACTURING COMPANY, 1909 TO 1949

Abstract: Early in the 20th century, predating most academic and practitioner literature, Dennison Manufacturing's top management recognized that certain kinds of distribution costs, normally treated as part of general overhead and allocated based on prime costs, were highly relevant for product-costing and pricing decisions. They pulled as many identifiable direct costs of distribution as possible out of the general overhead pool and assigned them to the appropriate product lines as extra information for the managers of those lines. However, these off-book assignments of costs were not fully understood and caused misunderstandings for many years. New archival evidence allows us to see the frustrations of managers who wanted to understand and use this information and how they attempted to solve these problems.

Dennison Manufacturing Company, now a subsidiary of Avery-Dennison, was founded in the mid-19th century. During the first half of the 20th century, the period of this study, Dennison manufactured a range of paper products including tags, boxes, holiday goods, crepe paper, and seals and labels. Dennison produced some five or six thousand items within those product lines, half of them special orders and half throughput, for a varied customer base. Vollmers [1993] discussed the company's treatment of distribution costs (both order-filling and order-getting costs) based on published articles by Dennison's statistician, E.S. Freeman [1929, 1933]. The company's efforts within the area of distribution costing ap-

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peared to be on the cutting edge of this type of cost analysis. The subsequent discovery of materials from the company's archive relating to order-filling costs, dating from as early as 1909, enriches that previous research and is the focus of this work. Order-getting costs, such as advertising and sales expenses, were handled quite differently by the company because of their speculative nature and are therefore not considered in this paper.

First called "supplementary" and later "secondary" costs by company managers, order-filling costs arose from the clerical, warehousing, filling, packing, shipping, and collection activities on customer orders — costs incurred both prior and subsequent to the manufacturing process. Some of these costs, managers discovered, were material in size and could be directly traced or were reasonably allocable to commodity (product) lines. Accordingly, Dennison's statistical and accounting departments put an immense effort, in terms of personnel and time, into tracing, analyzing, and distributing these costs to achieve a better understanding of both how they were driven and to which commodities they were attributable. The purpose of this research is to describe the evolution of this work at Dennison and to highlight the problems the firm faced. The work begins with a brief description of the Dennison archive, followed by a literature review, the Dennison story, and a conclusion.

THE DENNISON ARCHIVE

The archive of Dennison Manufacturing is located in Framingham, Massachusetts, in a storage room in the administration building of the company. Where once the company employed professional historians to maintain and develop the company's archive, it has now sunk to quite a low state. The room is filthy, doubtlessly accelerating the deterioration of the delicate onionskin paper used for correspondence. The documents are probably only being preserved because nobody is interested enough to discard them. There is no general indexing system for the collection as a whole. Files, however, are in file cabinets; some are even organized alphabetically. The materials used in this study were found in manila file folders entitled "Secondary Costs," "Costs," "Costing Conference," and "Accounting Committee Minutes." The contents of these files overlap considerably. The researcher cannot depend upon all references to a desired topic being contained in any one folder. Other file drawers are dedicated to "Factory Cost Reports" or

"Treasurer's Reports," organized by date. There are no ledgers or journals. There are decades of correspondence, annual reports of the company's governing committees, special studies (e.g., histories of products, a study of business cycles) coordinated and/or collated by the historians, etc. For a detailed description of the archive, see Vollmers [1998]. Copies of the memos and reports used in this research are available from the author.

Archival research is difficult, costly, time consuming, and subject to substantial biases. There is the bias of preservation (what was saved and why), the bias of choice (what was found and chosen by the researcher), and finally the bias of interpreting history from one's own perspective. Is it possible to understand the past? Is objectivity possible? The bias of subjectivity has been the subject of considerable debate in the academy. Some believe the data will speak for themselves. Others find this view hopelessly naïve and argue that there is no possibility of reconstructing an objective history [see, for example, Fleischman et al., 1996]. Nevertheless, despite these problems, archival research is the only method available for approaching an understanding of how accounting was used, was integrated into the decision-making process, and was adapted to problems that surfaced in its environment.

I believe, despite possibilities of error in evidence and error in interpretation, that the archival journey is filled with fascination and meaningful information. One finds perceptions of the world and areas of familiarity that differ from one's own. The researcher discovers surprising techniques and processes. Then one can ask why. Why did new techniques occur? Why did the methods change or disappear? Or what was it about a process that allowed it to survive? Even if one's interpretation is misinformed to some degree, it may be that the information found will shed light on the present. If, as this research shows, activity-based costing was being used, what conditions were present that led to its adoption? Why did it not spread to other firms? Will the activity-based systems now in use disappear as did those of this earlier period or have technological advancements solved some of the problems that earlier complex systems faced? Finally, of course, archival research can be fun.

LITERATURE REVIEW

Although Dennison Manufacturing's managers were surely not the first to turn their attention to distribution costs, their

interest appears to have arisen spontaneously. If it were common or noteworthy for any company, practitioner, or academic to examine or discuss them, it was not reflected in contemporary literature (1900-1920). Chatfield and Vangermeersch [1996, p. 210] reported that only two articles on distribution cost and selling expense appear in the *Accountant's Index* from 1910-1919 and, indeed, that seems to be the case. If there are more articles on the topic, they are not indexed in such a way that they can be easily identified. One of the two, Frazer's 1912 article in the *Journal of Accountancy*, not only appears to be unique, but the literature did not build on this topic until the 1920s. Frazer [1912, p. 26] said that distribution costs are usually ignored, combined with other expenses, because they are indirect, "personal and psychological in their character and do not admit of standardization." Asserting that this treatment was an error, he categorized distribution costs into the broad headings of "cost of selling," the "cost of storing, packing and delivery," the "cost of collection," and "general indirect expense." He discussed various methods for allocating these costs to sales orders and the pros and cons of each. For example, the direct costs of a sales order, including the materials and labor incurred in packing and shipping, should be assigned to the order, with other costs allocated using a rational method "indicative of the expenditures in the department concerned" [Frazer, 1912, p. 43]. Other literature from the period contains a fair number of articles on keeping sales records of various types (sales by salesmen, by territories, by customer, etc.) for analysis purposes, but product or other costing issues are not addressed [see, for example, Lewis, 1917]. *The Accountant* (British) committed but one article during the two decades to distribution costs, stating that "few manufacturers have attempted to analyse selling costs on a scientific basis, and very few retailers know anything at all about their true expense of conducting business" [Allen, 1919, p. 58].

Henry Dennison, Dennison's long-time president, joined the Taylor Society in May 1917 and became its president in December 1919. Since the *Accountant's Index* did not include the *Bulletin of the Taylor Society*, would this journal be the source for contemporary thinking about distribution costs? It was not. The Society's *Bulletin*, first published in December 1914, did not contain any discussions of product costs or allocations of any kind, at least during its first decade. Members focused on various issues of efficiency but did not discuss how to measure it, apart from time-and-motion studies, or how cost

accounting could contribute to an understanding of this elusive concept. They may well have considered costing issues among themselves, but if so, such deliberations did not make their way into the *Bulletin*.

In contrast to the silence of the previous two decades, distribution costing literature exploded in the 1920s and the 1930s. At least 30 related articles appear in the *National Association of Cost Accountants Bulletin* (*NACA Bulletin*), the journal of the National Association of Cost Accountants, founded in 1919. Also, beginning around 1925, virtually all cost textbooks came to include some coverage of the topic, ranging from a few pages to several chapters [Vollmers, 1993, 1997]. Much of this literature recommended analyzing these costs by customer, channel of distribution, or territory [see, for example, Van Sickle, 1938].

This seemingly sudden fascination with distribution costs arose for a variety of reasons. The severe recession of 1920-1921 spurred a general impulse to identify and control costs. Secretary of Commerce Herbert Hoover requested a study of waste, and the resulting *Report on Waste in Industry*, released by a committee of the Federated American Engineering Societies in 1921, found, among many other things, a correlation between the large increases in distribution costs and increasing product variety. Hoover later directed the Domestic Commerce Division of the Chamber of Commerce to study distribution costs in various industries. Its series of census results, published in 1929, 1933, and 1935, confirmed the linkage between product differentiation and a spiraling increase in distribution costs [Stewart et al., 1939]. Others also recognized that distribution costs were increasing rapidly relative to other company costs [Castenholz, 1930; Longman, 1941]. Nevertheless, despite the advice of government and the apparent response of practitioners contributing to the *NACA Bulletin*, there is little evidence that many companies attempted to tackle these rather slippery, illusive, but expensive costs. In fact, in the introductory notes to Freeman's [1929] article, the editors of the *NACA Bulletin* noted that, to their knowledge, very few efforts in the distribution area were forthcoming.

An exception was Dennison Manufacturing. E.S. Freeman [1929, 1933], Dennison's chief statistician, reported in the *NACA Bulletin* that, by analyzing cost statistics the company had retained for years, causes of cost variation could be identified and used to determine more accurate costs and profits by product line. These efforts clearly presaged activity-based costing. The cost drivers, including weight of the product, number

of orders, and number of items in an order, were used to distribute variable order-filling costs to commodity lines. It is difficult to know whether these distributions actually entered the accounting records. Freeman's comments suggest true book allocations, but one cannot be sure. Earlier, as this research will show, the distributions were definitely off-book and were meant to provide chairmen with additional information regarding the costs of their product lines. The company's understanding and use of these costs evolved over time. The effort was substantial, but the results were often unclear and misunderstood.

We will see that it was Henry Dennison who maintained the momentum behind the company's interest in distribution costs. What brought his attention to this area so early? I believe the answer lies in his commitment to learning. He was a member of and a contributor to many organizations, including the aforementioned Taylor Society, the American Economic Association, the Boston Chamber of Commerce, and the Association for Labor Legislation [Dennison, 1955]. In 1922, always interested in management methods, he formed the Manufacturers Research Association, a consortium of companies that contributed personnel and financial resources to maintain a research staff for studying and sharing information about management methods. He was also a trustee of the research organization, the Twentieth Century Fund, from 1926 until his death and was vice chairman of the International Management Institute of Geneva, Switzerland from 1927-1933. Henry Dennison's business and political views, as well as the company's efforts in many areas, were frequently published and presented to interested groups. Early on, his progressive opinions on profit sharing, put into practice at his company, found their way into publication [Dewhurst, 1915; Dennison, 1918]. The company's unemployment insurance program, begun in 1916, was the first in the U.S. His opinions that good management was only possible when the manager was on-site and that financial or absentee management was bad, almost by definition, were well-known [Forester, 1912; Dennison, 1915]. His theories and efforts to smooth out business cycles were widely published [Dennison, 1922a, 1922b; Feldman, 1922].

Dennison and other company executives frequently contributed to the *NACA Bulletin*. The reader should note that articles included in the *NACA Bulletin* and the *Bulletin of the Taylor Society* were typically transcripts of presentations at meetings. Managers and others interested in cost accounting

issues or in solving other business problems attended these meetings to learn from one another. This commitment to contributing to and learning from peers is undoubtedly the source of Dennison's examination of cost behavior in his own firm and the reason why he continually tried to put that understanding to use. The unique problems of distribution costs were very likely discussed informally at these meetings of managers and cost accountants, despite the absence of written evidence.

Modern literature on distribution costing has been relatively sparse. Anderson [1979], in an historical piece, reported on some of the methods of distribution analysis favored by early writers. Lambert and Armitage [1979] criticized the academy for not teaching distribution costing, handicapping practitioners by leaving them oblivious to a major area of costing difficulties. Rarely do cost or management textbooks more than mention the topic. Miller and Vollman [1985] drew attention to the explosion of overhead costs supporting factory operations. These costs are caused or driven by structural activities, not by output. Continuing to accumulate and allocate these costs using direct labor hides them and allows them to increase. Bridging the academic and the practical is an excellent research study by Schiff and Schiff [1994]. Their literature review, which ignored the rich literature of the pre-1950 period, showed that distribution costing was very topical in the 1950s and 1960s but disappeared from the literature in the 1970s and 1980s. It has reemerged in the 1990s in a small number of articles which use activity-based costing as a framework for analysis. They have also included case studies of three firms that attend closely to their marketing costs [Schiff and Schiff, 1994, pp. 9-19]. Foster et al. [1996] recognized that profitability depends not only on the unit factory cost of a product but also on the marketing, distribution, and customer services required. Hence, they recommended an activity-based costing approach to these other areas using drivers such as purchase orders, number of shipments, and number of invoices. Very recently, a series of short features by Cooper and Slagmulder [1998a, 1998b] have encouraged cost management beyond the factory walls and beyond the firm; that is, looking at costs and drivers that include, but are not limited to, both the order-filling and order-getting components of distribution costs. These feature articles are theoretical in nature and do not explain how the ideas might be put into practice.

A HISTORY OF SECONDARY COSTS AT DENNISON MANUFACTURING

The Dennison archive contains a number of memos and reports on the topic of secondary costs spanning many years. Their existence shows that managerial recognition of these costing problems occurred very early, predating known publications in journals and textbooks. The effort to manage and understand these costs continued for many years but, contrary to Freeman's matter-of-fact presentation in his 1929 and 1933 articles, the in-house treatment of the costs confused many of the company managers for whom it was intended. Dennison's experience contributes to our understanding of why it appears that few companies tackled their distribution costs or, perhaps, why some of those that did failed to maintain interest after an initial effort. The clerical and analytical commitment was huge and the results ambiguous.

The earliest applicable company records are two virtually identical 1909 memos from the company's Committee on Records and Accounting — Dennison Manufacturing was managed largely by committees — to two executives referencing order-filling and other overhead costs. It reported that the current overhead allocation policy of distributing all general expenses aside from factory overhead using percentages based on prime cost was misleading. "This condition of things...is very undesirable as it consistently makes our best quality goods appear to cost more and our cheaper quality of goods less than they actually do cost."[1] Since the company relied heavily on special, customized orders (about 50% of its total production), it was enormously important that managers be able to estimate costs well so that they could establish competitive and realistic bids. They proposed to mitigate the problem by changing the method of overhead allocation. They said that while productive labor hours seemed the most theoretically appropriate method of allocation, those statistics were not readily available. The next best choice, they decided, was an allocation based on productive labor dollars. Labor rates, unlike the costs of materials, did not differ significantly among products; therefore, the distribution would be more equitable. The Committee proposed that the new method of allocation be adopted in February 1910.

[1] Compare Johnson and Kaplan [1987, p. 22]: "Costs get distributed by simplistic measures . . . and . . . systematically bias and distort product costs at the individual product level."

Although there was no attempt to differentiate between costs with different behavioral characteristics or, using modern terminology, different cost drivers, the Committee did understand the problems that arose from the choice of allocation base. Soon they were to begin looking even more closely at costs.

In January 1916, accounting manager A.B. Rich wrote to Freeman that Henry Dennison (then treasurer and director of works) wanted a report that separately stated the cost of packing cases in calculating the profit on product lines. Packing-case cost had been part of factory overhead, but Dennison recognized that it was largely a direct cost, not one evenly incurred over all products, and deserving of separate treatment. But how could these costs be distributed realistically to a vast array of products? Rich said the firm had on hand the cubic contents of various case sizes that could be used as standard for different products. Management might be able to distribute the cost of cases based on size, specifically cubic inches.[2] Though packing-case costs were direct costs, the logistics of assigning them to actual products or orders was assumed to be impossible; in fact, it was never mentioned. Hence, the Rich proposal that standard costs be adopted for a variety of case sizes was justified. Undoubtedly the cost of tracking all actual costs to products would outweigh the benefit of increased accuracy.

A.B. Rich forwarded a memo later in the year from the Records and Accounts Committee to Henry Dennison for comment, demonstrating the concepts of responsibility accounting and cost drivers. Rich was concerned about both:

> The warehousing and shipping which is done at Framingham does not seem to be a production expense, and consequently it should be included in the general selling expenses and not in factory cost. The more one considers the matter, the more it seems to be an item the control of which is in the hands of the selling organization and not the factory management. I am speaking of those causes of expenditure which depend on the kind of goods sold — the quantities of goods sold — the method of selling, whether or not through rehandling — and all the different methods of selling policies.

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[2] This memo was stapled to another piece of paper on which Freeman had written (probably in 1917) that Henry Dennison wanted more rather than less expense allocated to products. He wanted to reduce general overhead.

> If some attempt were made to include the extra cost of warehousing and shipping seasonal goods in the individual costs of the line, I believe truer returns would be made of the ultimate profit accruing from such items. Small quantities, if they prevailed exclusively, would cost more for equal value than large, as the element of labor employing handling, checking, billing to transportation companies, etc., is far greater than for a few large shipments.

Dennison's immediate response was mixed, judging from handwritten remarks appearing on the memo. In reference to pulling warehousing and shipping out of production cost, he wrote: "I would object on the whole for it would mean one more item removed from basic cost and responsibility left in the air more or less." He was not opposed to reclassifying costs; on the contrary, he wanted as many costs assigned to products as possible, but he was concerned that reclassifying these particular costs might remove them from anyone's direct responsibility. Rich continued to work on this project and, though we never discover who bore ultimate responsibility for the costs, in a later memo to E.S. Freeman, he wrote that:

> He [Dennison] favors our applying [warehousing and shipping] these items and any others of similar nature on the basis of the quantities as revealed by the quarterly statistics, thousands of tags etc. . . . and including with them such items as cost of cases and anything else that will be more accurately applied in this manner than it is at present.

Rich and Dennison had determined that some of these overhead items could be allocated effectively without losing responsibility. The costs were not hopelessly joint in nature and could be reasonably assigned to particular product lines. They were also material enough to warrant pulling them out of the general allocation pool. However, in order to make this assignment, neither the factory overhead pool (now allocated using direct labor cost) nor the selling expense pool (allocated on the basis of total manufacturing cost) could be used. Another method of allocation was needed and a third class of costs:

> This third group . . . may include . . . warehousing and shipping distributed on a quantity basis and then also Order Department on the basis of the number of orders and Tracing on the same basis. Possibly . . . Estimating, per estimate, Billing, per order, etc, and all of these various items might total up to enough to make a

> charge per order or per unit that could be added to either our Estimated costs or to our regular costs . . . but would not be added to factory cost as such.

The company accountants began to work on this category of costs, calling them "supplementary costs." Neither production volume nor sales volume drove these costs but rather, cubic inches, number of estimates, and number of orders. Soon the accountants, with the help of company statisticians, had pooled this third class of costs, allocated them to product lines, and sent the commodity chairmen (managers of product lines) off-book information on the supplementary costs of the product lines for which they were responsible.

Unfortunately, the information was based on averages, so that although commodity lines (e.g., tags, boxes, and crepe) were distinguished as were components of lines (e.g., marking tags and shipping tags), the various sizes and shapes of marking and shipping tags were not differentiated. Because there was considerable variety within lines, possibly hundreds of tag varieties, the supplementary information was not of direct help in estimating or pricing individual orders. This situation led to a considerable amount of documented confusion that lasted for years. Despite the best intentions and explanations issuing from accounting and statistics, some chairmen did not understand what they were supposed to do with this information and merely added the supplementary costs to factory costs when making pricing decisions. Freeman first referred to the problem in a 1918 memo to A.B. Rich. He had discovered that some chairmen were adding the supplementary cost they had received from his department to all orders, regardless of the size of the order. For example, a dollar of supplementary cost was being added across the board to orders ranging from ten cents to five dollars:

> When these [supplementary costs] were made up the idea was that they should be used by the chairmen, as a very rough indication of the additional cost applicable. Accordingly very broad averages were used. As a matter of fact, when the chairman goes to the cost sheet showing both factory and supplementary costs, he merely adds the two together and uses the total . . . one being given equal weight with the other. They tell me that they are held to a profit not over the factory cost but over the complete cost. If so much weight is to be given to these they will evidently require a much more profound study.

A.B. Rich wrote to J.P. Wills, sending him a copy of Freeman's memo and suggesting that they simply stop sending the information routinely to chairmen and refer to supplementary costs only when determining policies or when deciding whether to accept a special order with a very narrow profit margin. Wills responded that not all chairmen were making this error and that he was making sure that the others were informed. He wished to continue to receive the information.

In a lengthy 1918 statement, Freeman discussed innumerable supplementary costs and how they varied (cost drivers). The excerpt that follows is one of nine parts referencing clerical expense alone:

> Costs varying as per item on sales orders:
>
> Scrutinizing the orders when they come in by order clerk and censor.
>
> Pricing, with selling price and cost (less extra expense on specials).
>
> Typewriting invoices and typewriter supplies used thereby.
>
> Checking invoices.
>
> Punching commodity statistical cards and the cost of cards used.
>
> Pricing cost on store bills and inter-district orders.

The excerpt identified the item on the order as what today would be labeled the cost driver. Other drivers mentioned elsewhere include the number of estimates, the volume of business, and the number of customer accounts. Freeman then proposed reasonable methods of allocation, discussing the difficulties of each method and the softness of these data. For example, referring to the distribution of shipping labor and overhead costs on the basis of cubic inches, he said: "The difficulty ... is the dispute as to what the real unit is, and the difficulty where the unit varies within a commodity statistics group. Should the carton or the box within the carton be the unit when it is quite customary to split the carton?"

Later, in 1920, Freeman told Dennison that though they could trace supplementary costs to product lines fairly well, when the totals were "reduced to averages according to commodity classifications [e.g., tags] and then multiplied by the quantity shipped it is doubtful if the result is any nearer to the truth than a percentage on cost." Dennison responded by reiterating the purpose behind the supplementary cost idea:

> I believe we can more and more pull out of that great pool of selling expense items which can be directly al-

> located in one way or another, perhaps a half dozen ways. We should then ask in our prices that they cover factory cost, the specific selling costs and a further percentage to cover unallocated costs and our profit.

He wanted to find how costs varied to improve his understanding of product costs and to maximize the reasonableness of the company's pricing policies.

The only early quantitative data retained from the archive are contained in a report from the first six months of 1920, reproduced as Appendix A. It shows that of the $420,420 of secondary costs, $274,300 was allocated to the five broad lines or commodity categories.[3] Why $146,120 of the total was called a "loss" is unclear. The bulk of the secondary costs (63%) is attributable to warehousing and shipping and the remainder to various general office expenses. This apportionment represented an additional 7.7% over manufacturing costs (materials, labor, and factory overhead — called "primary" in the table). The total amount of secondary costs added another 11.7% above manufacturing costs. The allocations to the five lines ranged from 5 to 10% of primary costs, evidence that costs had been allocated differentially. The report also shows, on the second page of Appendix A, how general office expense, which appears aggregated at the bottom of the first page of Appendix A, was distributed to stock orders, box orders, and special (custom) orders per sales order and per item in total and per unit. The total costs of the Credit Department are not shown, but company accountants assigned $5,250 of those costs to Stock Orders, $1,620 to Special Orders, Except Box Orders, and $417 to Box Orders. Considerable effort was put into pulling costs out of general overhead and placing them into the secondary cost pool. This practice supports Freeman's 1929 and 1933 presentation of how the company handled those types of order-filling costs.

Further confirmation that these costs were used appeared in a 1922 report, "Method of Distributing and Figuring Overhead Expenses," by A.L. Hawes of the Cost Accounting Department. The report stated that secondary costs were to be divided among four factors: 1) stock goods (throughput, not special orders); 2) Box Division Special Orders; 3) three categories of other special orders (simple, plain orders; ordinary special

[3] At some time prior to this report, the term "secondary" had replaced "supplementary."

printed orders; complex or complicated orders); and 4) cubical inch basis. The first three factors included costs that varied by item in an order or by work order. The fourth factor included the cost of packing cases, wrapping material, and some labor and expense of the warehousing and shipping room which varied with the size of the goods handled. This report listed overhead expenses, categorized as "Secondary Costs," and described how they were distributed. For example:

> The sum of all costs applicable to stock goods [not customized] is divided by the total of all items of this class shipped, which gives the cost per item. The number of items is based upon the average quantity order at one time which are obtained from the commodity statistics report [a report generated by Freeman's department].

and

> The cost of packing cases, wrapping material and certain handling labor and expense in the warehousing and shipping rooms which varies with the size of the goods handled on the basis of 1000 cubic inches. Total expense is divided by the total number of thousand cubic inches shipped to obtain the cost per 1000 cubic inches.

Hawes said that these costs are used to help set selling prices and, in the commodity statistics reports, to determine the percentages of profit made on various items.

The purpose of these secondary costs continued to be misunderstood. In a 1923 memo, E. S. Freeman asked T. G. Portmore, chairman of the Merchandising Committee, to convene a costing and pricing conference to discuss this topic. Despite years of explanations, many people were still mistaking secondary costs for actual charges to orders rather than as additional information. "It is apparent that at least some . . . have had the impression that secondary costs were in fact charged to the orders, and as a consequence it appears that special prices on non-estimated jobs have been set lower than they would have been had these people had the correct understanding." Freeman's frustration is audible:

> The widest possible publicity has always been given to the fact that secondary costs were not entered on the order. The minutes of the Merchandise Committee meeting of November 18, 1920, state this fact very definitely. During the year which followed the adoption of

> secondary costs, Mr. C. F. Buckley had charge of Factory Billing Department as well as Sales Billing. That he must have known the secondary costs were not put on the order is self-evident from the fact that all the work of both departments was carried on under his direction. Furthermore, the fact that 1) Pricing and Billing were using and understanding secondary cost, and 2) Pricing and Billing were under the same chief clerk, seemed sufficient reason to assume that his successor understood. Factory Billing Department has long been turning over to the Pricing Department for investigation all orders priced by Sales Billing which showed less than 40 percent. This 40 percent was set by Mr. Howell in a letter to me last May in which the percentage was specified as 'primary revenue or gross profit,' which means over factory cost and not over factory plus secondary. A copy of this was given to Pricing Department.

It is not difficult to reconstruct the chain of events. The chairman of the Tag Division would receive the commodity statistics report for his operation. On it would appear a secondary cost of perhaps 6% on primary costs, an average across that commodity class. He was expected to adjust that percentage for types of tags and orders based on his knowledge of the good and his experience with the sales market. The customized tag orders clearly demanded more secondary costs on a percentage basis than did stock orders. However, because he believed that the secondary costs were charged uniformly to all orders, he set prices just above factory costs plus secondary cost (1.06 times factory cost). Hence, on orders requiring special care and handling, price estimates were set too low.

The minutes [1924] of the Committee on Accounting contained a familiar refrain: "Our secondary costs have never been properly understood and probably interferes with more than they aid proper judgement as to what selling prices should be." In view of long, troubled experience with them, Freeman and two other committee members recommended they be discontinued. At the conclusion of a lengthy 1925 report distributed to committee members prior to a "Special Costing Conference," E.S. Freeman reiterated that recommendation — abandon secondary costs.

Henry Dennison blocked this recommendation. Although no memo to this effect exists, circumstantial evidence abounds. These costs continued to be calculated and used by the company for many years. Freeman's 1929 article showed that the

company not only was still using secondary costs but had by then standardized them. The standards were used for budgetary control, for performance evaluation, and for informational purposes on gross profit by merchandise line (a synonym for commodity line). Freeman said that the costs of assembly, packing, and loading were directly assigned to products. These expense items were standardized based on a cost per unit varying by size. Other costs, aggregated, standardized, and called "cost per item on an order," included those arising from pricing and invoicing, the costs of the factory accounting department, etc. These costs per item were multiplied by the total items ordered in a month. The sum of both of these totals, total cost per item and the total per unit, were added to factory costs to determine the gross profit per merchandise (commodity) line.

Freeman compiled a report ("Box Line Profit and Loss," 1928) analyzing the probable effect on income over a number of years of dropping all or a part of the box commodity line. This keep-or-drop analysis included the differential effects of secondary costs. They were material in size, representing almost 25% of total costs. "The order-filling costs are estimated with a fair degree of accuracy. The gross profits or losses after deducting order-filling costs, can, therefore, be considered as fairly significant." Though but a single piece of evidence, it appears that managers used secondary costs in more than one way.

The last archival reference to secondary cost is a lengthy report written in 1949 by James Dennison, Henry Dennison's son, entitled "Interpretation of Secondary Costs for Factory and Merchandising Personnel." At the outset, James Dennison stated that he had been asked to write the report to explain to nonaccountants what secondary costs were, their purpose, how they were calculated, and how they were allocated. He reported that 38% of warehouse costs, 27% of production-planning costs, 13% of treasurer's costs, 13% of service costs (correspondence, etc.), 6% of the Box Division's costs (its own shipping and warehousing departments), and 1% of Printing's costs became Dennison's secondary costs, amounting to $1,220,000 (Appendix B).

The first table of Appendix B, "Distribution by Commodity," shows the assignment of the costs accrued in the support departments deemed to be secondary. For example, 21.2% of Outside Warehousing expenses were directly assigned to the Shipping and Marking Tag Line. Although many of the secondary expenses were to be divided equally among all lines, certain

lines pulled heavily on the support departments, particularly the Box Line, the Holiday Line, and the Shipping and Marking Tag Line. The second table, "Breakdown by Unit of Measure," shows how those same dollar amounts varied. Thus, Stock Costing expenses were driven 90% by the number of items in an order and 10% by the number of orders. The costs of Outside Warehousing were driven 63.5% by bulk (cubic inches) and the remainder by the order. He summarized thusly:

> What does all this give us? In the first place, we have an accurate and fair way of allocating the $1,220,000 expense to the cost of our products. We know how much it costs us to handle orders for each commodity. By adding that handling cost to the primary and transportation costs, we know the total cost of making, storing and shipping every Dennison item. Subtracting the total costs from the selling price leaves a balance which indicates whether or not the item is profitable. This in itself is justification enough for all the work going into the preparation of Secondary Costs.

CONCLUSION

The purpose of this research was to add some rare archival evidence to the limited literature on distribution costs. The many pertinent internal memos at Dennison Manufacturing show that distribution costs commanded the interest of management for many years. Considerable support was forthcoming to foster understanding and to maintain control over them. Calculated at least through 1949, statistical records of costs and qualitative data were retained and analyzed for years. Without computers, calculators, or easy-to-use adding machines, this undertaking was a considerable project.

Secondary cost information was to be used primarily for preparing estimates and making pricing decisions, but at least one extant report shows that they were also integrated into differential analysis and later standardized and used for budgeting and performance evaluation. It is strikingly familiar to read that managers responded to the numbers given to them while ignoring explanations of how numbers were to be used. This pattern adds to our growing knowledge about the effect statistics and accounting measurements have on behavior and on the tendency to privilege numbers over words. The continual difficulties that Dennison's management had with distribution costing, despite strong top management support, partially explains the rarity with which this type of analysis was applied in other

firms, at least in so far as is indicated by the literature.

Managers knew that these costs were driven by factors outside of production or sales volume. They also realized that no one cost and driver were perfectly or even closely correlated. Thus, although they decided to distribute certain costs on a cubic-inch basis, there is ample recognition in the memos that this approach was not the perfect answer, only that it was superior to their former method of allocating by a percentage of cost. For example, a large order of the same product certainly cost less to handle than an order of the same size packed with a variety of products. Nevertheless, managers thought it was better that the cost assignments be more nearly correct rather than completely wrong. It is difficult to assess whether Dennison's handling of these costs greatly improved by 1949 when the last reference to them appeared and impossible to determine whether their efforts paid off on the bottom line. Clearly, however, the project was still in place, suggesting either substantial inertia or a strong belief that expanding costing parameters had benefitted the firm.

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APPENDIX A

Secondary Costs – 6 Months 1920
Credits from Commodity Statistics

Lines	Estimated Selling Price	Primary Cost	Secondary Cost	Gross Amount	Per Cent Gross
Jewelers	$ 508,900	$ 351,600	$ 18,000	$ 139,300	0.396
Consumers	3,060,100	1,971,800	143,900	944,400	0.479
Dealers	808,100	472,800	37,600	297,700	0.630
Crepe	1,143,500	703,900	70,400	369,200	0.525
Holiday	108,400	67,100	4,400	36,900	0.550
Total	$5,629,000	$3,567,200	$ 274,300	$1,787,500	0.501
Retail Profit	$ 90,000			$ 90,000	
Total	$5,719,000	$3,567,200	$ 274,300	$1,877,500	0.526
Loss on Purchases		$ 19,900		$ (19,900)	
Loss on Secondary			$ 146,120	$ (146,120)	
Total	$5,719,000	$3,587,100	$ 420,420	$1,711,480	0.477

Charges from Expense Accounts

Packing material	$ 118,921
Other Dept. 9 Labor and Expense	87,161
Dept. 30 Labor and Expense	60,560
Total Warehousing and Shipping	266,642
Total General Office	153,778
Total (In table above)	$ 420,420

Distribution of General Office Expense

Secondary costs	Sales Order Basis	Item Basis
Stock Order	$ 49,185	$ 18,186
Box Orders	5,266	11,784
Special Orders	23,933	45,424
Total Per Order		75,394
Total Per Item	78,384	78,384
Total Charged Secondary Costs		153,778
Charged to Primary Cost		25,691
Charged against Gross Profits.		24,129
		$ 203,598

APPENDIX A – CONTINUED

Composition of Secondary Costs: Stock Orders

	Cost for 6 months		Cost per Order or Item	
	for 100 M Sales Orders	for 350 M Items	per Sales Order	per Item
Credit Dept.	$ 5,250	$ —	$0.053	0.000
Pricing and Estimating	—	—	0.000	0.000
Planning and Tracing	3,615	350	0.036	0.001
Billing	2,230	10,473	0.022	0.030
Cashier, Ledger & Index	9,985	—	0.100	0.000
Costing and Tabulating	910	7,363	0.009	0.021
Filing and Mail	4,630	—	0.046	0.000
Correspondence	11,290	—	0.113	0.000
Sales Div. Stationery	4,660	—	0.047	0.000
Sales Div. Postage	5,115	—	0.051	0.000
Misc. Expense	1,500	—	0.015	0.000
	$49,185	$18,186	$0.492	$0.052

Composition of Secondary Costs: Special Orders, Except Box Orders

	Cost for 6 months		Cost per Order or Item	
	for 32 M Sales Orders	for 40 M Work Orders	per Sales Order	per Item
Credit Dept.	$ 1,620	—	0.053	0.000
Pricing and Estimating	—	5,433	0.000	0.136
Planning and Tracing	9,275	31,304	0.290	0.078
Billing	716	1,842	0.022	0.046
Cashier, Ledger & Index	3,179	—	0.100	0.000
Costing and Tabulating	295	6,845	0.009	0.171
Filing and Mail	1,473	—	0.046	0.000
Correspondence	3,700	—	0.115	0.000
Sales Div. Stationery	1,500	—	0.047	0.000
Sales Div. Postage	1,650	—	0.051	0.000
Misc. Expense	475	—	0.015	0.000
	$23,883	$45,424	$0.748	$0.431

Composition of Secondary Costs: Box Orders

	Cost for 6 months		Cost per Order or Item	
	for 8000 Sales Orders	for 9000 Work Orders	per Sales Order	per Item
Credit Dept.	$ 417	0	$0.053	0.000
Pricing and Estimating	—	1,500	0.000	0.170
Planning and Tracing	1,626	5,100	0.203	0.566
Billing	180	1,924	0.022	0.214
Cashier, Ledger & Index	800	—	0.100	0.000
Costing and Tabulating	72	3,260	0.009	0.362
Filing and Mail	350	—	0.046	0.000
Correspondence	919	—	0.115	0.000
Sales Div. Stationery	370	—	0.047	0.000
Sales Div. Postage	410	—	0.051	0.000
Misc. Expense	122	—	0.015	0.000
	$35,266	$11,784	$0.661	$1.312

APPENDIX B
Secondary Costs – Distribution by Commodity

Secondary Expense Departments	Total Dollars - 1948	Equally Among All Lines	Box Line	Holiday Line	Dealers Line	Gummed & Bronze	Labels & Seals Consumer	Crepe	Shipping & Mktg Tags	Outside Purchases
Christmas Warehouse	$ 40,000			100.0%						
Production Planning Dept.	24,032		1.9%	59.6%		9.1%	6.6%	0.7%	20.3%	1.8%
Label	43,768		3.8%	4.8%			82.1%		9.3%	
Gum	16,855					100.0%				
Holiday	23,533			92.2%	3.0%			4.8%		
Tag	61,962		0.2%		5.8%				94.0%	
Box	17,639		100.0%							
Electro Storage	13,789		2.0%	10.0%	5.0%		30.0%	3.0%	50.0%	
Order Register	31,830	53.8%	4.4%	10.6%		2.3%	6.3%	0.8%	20.0%	1.8%
Stock Costing	25,998	100.0%								
Correspondence	29,298	90.0%								10.0%
Files	27,510	100.0%								
Credit	40,542	100.0%								
Accts. Receivable	33,263	100.0%								
Billing	63,619	85.9%		14.1%						
Warehouse Division										
Traffic	25,508	100.0%								
Dept. 9	59,343	100.0%								

APPENDIX B (Continued)
Secondary Costs – Distribution by Commodity

Secondary Expense Departments	Total Dollars - 1948	Equally Among All Lines	Box Line	Holiday Line	Dealers Line	Gummed & Bronze	Labels & Seals Consumer	Crepe	Shipping & Mktg Tags	Outside Purchases
3OP	152,048	81.8%				18.2%				
3OF	89,170	30.6%		20.4%	16.4%	0.2%		22.8%	9.6%	
Packing Materials	131,800	80.5%				19.5%				
Sales Service	16,930	100.0%								
30 Office	52,218	58.0%		5.4%	15.7%	3.5%		8.6%	7.9%	
Outside Warehousing	24,033	31.6%	0.9%			9.4%	6.4%		21.2%	
Transcribing	32,558	100.0%	31.8%							
Part Office Expense		100.0%								
Postage, etc.	73,732									
Marlboro-Box Division										
Shipping	52,107		100.0%							
Milford Stk Box										
Warehousing	16,363		100.0%							
Total Dollars	$1,219,448	$ 729,084	$ 98,155	$ 112,917	$ 27,818	$ 77,499	$ 45,077	$ 26,759	$ 98,202	$ 3,937
% of Total Carried by Each Grouping		60.0%	8.0%	9.0%	2.0%	6.0%	4.0%	2.0%	8.0%	1.0%

APPENDIX B (CONTINUED)
Secondary Costs – Breakdown By Unit Of Measure (Variable)

Secondary Expense	Measured Per:		Measured Per:		Measured Per:		Measured Per:		Total
Departments	Order	% Total	Cubic Inch	% Total	Item	% Total	Unit	% Total	$ - 1948
Christmas Warehouse	$ 4,830	12.1%	$ 24,696	61.7%	$ 10,474	26.2%			$ 40,000
Production Planning Dept.	23,537	97.9%					$ 495	2.1%	24,032
Label	38,603	88.2%					5,165	11.8%	43,768
Gum	11,798	70.0%					5,057	30.0%	16,855
Holiday	588	2.5%					22,945	97.5%	23,533
Tag	51,707	83.5%					10,255	16.5%	61,962
Box	17,022	96.5%					617	3.5%	17,639
Electro Storage	11,717	84.9%					2,072	15.1%	13,789
Order Register	31,830	100.0%							31,830
Stock Costing	2,600	10.0%			23,398	90.0%			25,998
Correspondence	29,298	100.0%							29,298
Files	27,510	100.0%							27,510
Credit	40,542	100.0%							40,542
Accts. Receivable	33,263	100.0%							33,263
Billing	41,772	65.6%			21,847	34.4%			63,619
Warehouse Division									
Traffic	20,407	80.0%					5,101	20.0%	25,508
Dept. 9	11,869	20.0%	47,474	80.0%					59,343

APPENDIX B (Continued)
Secondary Costs – Breakdown By Unit Of Measure (Variable)

Secondary Expense Departments	Measured Per: Order	% Total	Measured Per: Cubic Inch	% Total	Measured Per: Item	% Total	Measured Per: Unit	% Total	Total $ - 1948
3OP	13,978	9.2%	138,070	90.8%					152,048
3OF			27,761	31.1%			61,409	68.9%	89,170
Packing Materials			131,800	100.0%					131,800
Sales Service	16,930	100.0%							16,930
30 Office	12,056	23.1%			20,309	38.9%	19,853	38.0%	52,218
Outside Warehousing	8,800	36.5%	15,233	63.5%					24,033
Transcribing	32,558	100.0%							32,558
Part Office Expense									
Postage etc.	73,732	100.0%							73,732
Marlboro-Box Division									
Shipping			52,107	100.0%					52,107
Milford Stk Box									
Warehousing			14,563	89.0%			1,800	11.0%	16,363
Total per Variable	$ 556,947	46.0%	$ 451,705	37.3%	$ 72,921	6.0%	$ 130,217	10.8%	$ 1,219,448